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09/576,999	05/24/2000	Syed Aon Mujiaba	2925-0261P	4786

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EXAMINER

ZEWDU, MELESS NMN

ART UNIT	PAPER NUMBER
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2683

DATE MAILED: 10/03/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/576,999

Applicant(s)

MUJTABA ET AL.

Examiner

Meless N Zewdu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) none is/are withdrawn from consideration.
- 5) ☒ Claim(s) none is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-23, 25-36, 38 and 39 is/are rejected.
- 7) ☒ Claim(s) 11, 24 and 37 is/are objected to.
- 8) ☒ Claim(s) none are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment (Response)

1. This action is in response to the communication filed on 7/17/03.
2. Claims 1-39 are pending in this action.
3. This action is final.

Claim Rejections - 35 USC § 103

I. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

II. Claims 1, 3, 4, 8, 12, 13, 14, 16, 17, 21, 25-27, 29, 30, 34, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (APA) in view of Kalliojarvi (WO 98/19488).

As per claim 1: the claimed feature is directed to a base station, servicing a macrocell, comprising, at least one steerable N-dimensional antenna ($N \geq 2$) array co-located with an antenna of said base station, for serving a microcell within the macrocell. The admitted prior (APA) art teaches about localized micro/picocells that may be established within overlying macrocells to handle traffic "hot spots" (see page 1, line 14-page 2, line 24). Here, since the macrocell is overlying the microcell, the two types of radio communication cells and their respective antennas can obviously be considered as co-located. But, the APA does not explicitly teach about whether or not at least one of

these antenna is steerable N-dimensional ($N \geq 2$) array, as claimed by applicant. However, in a related field of endeavor, Kalliojarvi teaches that two dimensional or three dimensional arrays can be used in an antenna (see page 4, lines 6-12) wherein the multi-dimensional antenna array is steerable by phasing the antenna elements (see all the document, particularly, page 5, lines 23-29). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify at least one of the antennas in the APA's communication system with Kalliojarvi's steerable, multi-dimensional antenna array system for the advantage of computing the location of a terminal equipment from the known values of the antenna array height from the ground and estimated bearing and elevation angles of the signal received by the antenna array as taught by Kalliojarvi (see page 4, lines 9-12).

As per claim 3: the base station, wherein the microcell includes a hot spot reads on APA (see page 1, lines 14-19).

As per claim 4: the base station, wherein said base station includes a steerable N-dimensional ($N \geq 2$) array for each microcell within the macrocell reads on '488 (see page 4, lines 3-12).

As per claim 8: the base station, wherein said at least one steerable N-dimensional ($N \geq 2$) array serves a hot spot reads on APA (see page 1, lines 14-17). When modified as shown above, said at least one steerable N-dimensional ($N \geq 2$) array, in the base station, will be able to serve a hot spot.

As per claim 12: the base station, wherein said base station is part of a TDMA system and the macrocell and microcell are separated in one of the frequency and code domain reads on '488 (see page 9, lines 22-36).

As per claim 13: the base station, wherein said base station is a part of CDMA system and the macrocell and the microcell are separated in on of the frequency and code domain reads on '488 (see page 6, lines 11-28; page 9, lines 22-31).

As per claim 14: the features of claim 14 are similar to the features of claim 1, except one difference limitation, the difference of which is provided hereinbelow.

Steering a resultant beam of the at least one steerable N-dimensional ($N \geq 2$) array toward the at least one microcell reads on '488 (see page 5, lines 25-29).

As per claim 16: the feature of claim 16 is identical with the feature of claim 3. Hence, claim 16 is rejected on the same ground and motivation as claim 3.

As per claim 17: the features of claim 17 are identical with the features of claim 4. Hence, claim 17 is rejected on the same ground and motivation as claim 4.

As per claim 21: the feature of claim 21 is similar to the feature of claim 8. Hence, claim 21 is rejected on the same ground and motivation as claim 8.

As per claim 25: the feature of claim 25 is identical with the feature of claim 12. Hence, claim 25 is rejected on the same ground and motivation as claim 12.

As per claim 26: the feature of claim 26 is identical with the feature of claim 13. Hence, claim 26 is rejected on the same ground and motivation as claim 13.

As per claim 27: the feature of claim 27 is identical with the feature of claim 1. Hence, claim 27 is rejected on the same ground and motivation as claim 1.

As per claim 29: the base station, wherein the microcell includes a hot spot reads on APA (see page 1, lines 14-19).

As per claim 30: the feature of claim 30 is identical with the feature of claim 4. Hence, claim 30 is rejected on the same ground and motivation as claim 4.

As per claim 34: the feature of claim 34 is identical with the feature of claim 8. Hence, claim 34 is rejected on the same ground and motivation as claim 8.

As per claim 38: the feature of claim 38 is identical with the feature of claim 12. Hence, claim 38 is rejected on the same ground and motivation as claim 12.

As per claim 39: the feature of claim 39 is identical with the feature of claim 13. Hence, claim 39 is rejected on the same ground and motivation as claim 13.

Claims 2, 15 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 14 and 27 above, and further in view of Fujii (EP 0 531 090 A2).

As per claim 2: the APA in view of Kalliojarvi do not explicitly teach about the feature wherein the at least one steerable N-dimensional array serving the microcell is co-located on an antenna tower with the antenna serving the macrocell, as claimed by applicant. However, in a related field of endeavor, Fujii teaches about a first small cell being provided in a radio cell (macrocell) by a first antenna provided in a base station, and a second small cell (microcell) which is smaller than said first small cell being provided in said first small cell by a second antenna provided in said base station (see col. 2, lines 33-54; figs. 5A; 5B; 5D; 6A; 7A; 11-16C). As can be seen in the figures, the antennas are co-located in a base station and one serves the smaller cell while the other one serves the small cell. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to have a microcell antenna co-located with a macrocell/base station antenna for the advantage of improving the effect of re-use partition of cells (see col. 2, lines 32-32).

As per claim 15: the feature of claim 15 is identical to the feature of claim 2. Hence, claim 15 is rejected on the same ground and motivation as claim 2.

As per claim 28: the feature of claim 28 is similar to the feature of claim 2. Hence, claim 28 is rejected on the same ground and motivation as claim 2.

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III. Claims 5, 10, 18, 23, 31 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 14 and 27 above, and further in view of examiner's Official Notice.

As per claim 5: some of the features of claim 5 are similar to the features of claim 1.

Hence, similar features of claim 5 are rejected on the same ground and motivation as claim 1. The difference limitation calls for --- an N-dimensional digital filter for receiving inputs from at least two antenna elements and processing the inputs to produce a beam formed output. Examiner believes that filtering signals to remove the unwanted noise/spike and to shape signals up to a better condition for further process is well known in the art of signal processing. Furthermore, it is also known digital filters are used to filter digital signals and analog filters are used to filter analog signals. In the instant application, the steerable N-dimensional array utilizes digital signals. The dimension of digital filters is obviously dictated by the dimension of the array being used. Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use an N-dimensional digital filter to filter/process an N-dimensional array a filters since the dimension of the digital filter will be determined by the dimension of the digital array.

As per claim 10: the base station, wherein said at least two antenna elements are arranged in a two-dimensional plane or a surface of a cylinder reads on '488 (see page 4, lines 3-30; page 5, line 23-page 6, line 10; page 9, lines 3-31).

As per claim 18: the features of claim 18 are similar to the features of claim 5. Hence, claim 18 is rejected on the same ground and motivation as claim 5.

As per claim 23: the features of claim 23 are identical with the features of claim 10. Hence, claim 23 is rejected on the same ground and motivation as claim 10.

As per claim 31: the features of claim 31 are similar to the features of claim 5. Hence, claim 31 is rejected on the same ground and motivation as claim 5.

As per claim 36: the features of claim 36 are identical with the features of claim 10. Hence, claim 36 is rejected on the same ground and motivation as claim 10.

IV. Claims 6, 7, 19, 20, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 5, 14, 18, 27 and 31 above, and further in view of examiner's Official Notice and further in view of Searle (US 4,743,871).

As per claim 6: the references used thus far do not explicitly teach about a base station wherein at least one of inputs and outputs of said at least two antenna elements are weighted to steer a resultant output beam of said at least one steerable N-dimensional array, as claimed by applicant. However, in a related field of endeavor, Searle teaches about means and method of taping, weighting, and summing received RF signals using an adaptive filter (see entire document). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to add Searle's adaptive filter means to the above modified prior art for the advantage of distinguishing the wanted signal from that of the unwanted (see col. 1, lines 20-22).

As per claim 7: the base station wherein the at least one of inputs and outputs of said at least two antenna elements are weighted using variable filter tap weights reads on '871 (see entire document, particularly, col. 1, lines 23-40; col. 2, lines 15-55).

As per claim 19: the feature of claim 19 is the same as the feature of claim 6. Hence, claim 19 is rejected on the same ground and motivation as claim 6.

As per claim 20: the feature of claim 20 is the same as that of claim 7. Hence, claim 20 is rejected on the same ground as claim 7.

As per claim 32: the feature of claim 32 is the same as the feature of claim 6. Hence, claim 32 is rejected on the same ground and motivation as claim 6.

As per claim 33: the feature of claim 33 is the same as that of claim 7. Hence, claim 33 is rejected on the same ground as claim 7.

V. Claims 9, 22 and 35 are are rejected under 35 U.S.C. 103(a) as being unpatentable over the above references used in claims 1, 5, 6, 14, 18, 19, 27, 31 and 32 above, and further in view of Grobert (US 5,317,322).

As per claim 9: the above references do not explicitly teach about varying the spread and direction of the resultant output beam of the steerable antenna described above. However, in a related field of endeavor, Grobert teaches about a steerable phased array antenna wherein the resultant beam of the antenna is varied/adjusted by adjustment of the weighting factors (see col. 3, lines 3-61). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to further modify the above references with the teaching of Grobert for the advantage of steering an antenna to a direction that enhancing signal reception.

As per claim 22: the feature of claim 22 is the same as that of claim 9. Hence, claim 22 is rejected on the same ground as claim 9.

As per claim 35: the feature of claim 35 is the same as that of claim 9. Hence, claim 35 is rejected on the same ground as claim 9.

Response to Arguments

Applicant's arguments filed on 7/17/03 have been fully considered but they are not persuasive. Arguments of applicant and examiner's responses are provided below.

Argument: with regard to claims 1, 3, 4, 8, 12, 13, 14, 16, 17, 21, 25-27, 29, 30 and 34, applicant argues by saying the APA (used by examiner as a primary reference) does not teach the antennas being on the same antenna tower.

Response: the claims call for co-locating two antennas as recited, for example in claim 1. Hence, "co-located", while the argument sounds semantic, does not exclude the antennas being on same antenna tower.

Argument: again with regard to same claims and contrary to the first argument, applicant asserts that the combined prior art rejection does not teach all the claimed limitations, "namely, that the antennas are located on the same tower as defined in the specification".

Response: examiner disagrees with this argument since it is based on what is defined in the specification and not based on what is claimed.

Argument: applicant, regarding same claims, argues that the prior art record fails to provide the required evidence of a motivation to combine the APA with Kalliojarvi.

Response: examiner respectfully disagrees with the argument. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or

modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, examiner believes that Kalliojarvi's steerable, multi-dimensional antenna would have prompted one of ordinary skill in the art at the time the invention was made to use it for modifying the APA because of the advantage it provides for computing the location of a terminal equipment from the known values of the antenna array height from the ground and estimated bearing and elevation angles of the signal received by the antenna array as taught by Kalliojarvi (see page 4, lines 9-12) wherein locating terminals in wireless communications systems is known to be one of the critical parameters.

Argument: with regard to claims 2, 15 and 28, applicant argues by raising the issue of motivation for combining the references (APA, Kalliojarvi and Fujii).

Response: examiner respectfully disagrees with the argument. Applicant (see REMARKS, page 14, lines 10-14) admits that the "the Fujii patent may provide a reason for cell re-use partition in a mobile communication system". This was cited and provided in the previous Office Action by examiner as the motivating evidence for combining the Fujii' reference with the others. Here is the full text of the reason for combining as provided in the previous Office Action--- "Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to have a microcell antenna co-located with a macrocell/base station antenna for the advantage of improving the effect of re-use partition of cells (see col. 2, lines 32-32). Applicant seems to be disagreeing with examiner that reason for combining is same as motivation for

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combining. Finally, examiner, as shown in the record, believes that evidence of motivation has been provided as required.

Argument: again with respect to claims 2, 15 and 28, applicant argues by saying that the combining Fujii's cell re-use pattern with the steerable N-dimensional array of Kallijarvi with APA would require a substantial reconstruction and redesign of the tilt angles used to track the directivity and distance of the respective cells elements.

Further, this would render obsolete the steerable N-dimensional array of the Kallijarvi system, thus destroying its function.

Response: examiner respectfully disagrees with the argument, in that the combination would be according to the teachings and motivations provided in the rejection of the claims, as oppose to simply lamping the references together, as applicant seems to be believing. Lamping is not what one of ordinary skill in the art would do when he/she applies a teaching from a reference.

Argument: with regard to claims 6, 7, 9, 19, 20, 22, 32, 33 and 35, applicant argues against examiner's taking of an Official Notice and asks for a supporting proof.

Response: the indicated claims are directed to weighting at least the input or output of two antenna elements using variable filter tap weights. Examiner took Official Notice by saying that the use of variable filter tap weights is well known in the art of communication signals processing and would have been obvious for to use for one of ordinary skill in the art. The proof to support examiner's assertion could be found in the following Us patents (4,743,871; 5,005,185; 4,755,890).

Allowable Subject Matter

VI. Claims 11, 24, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meless N Zewdu whose telephone number is (703) 306-5418. The examiner can normally be reached on 8:30 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Trost can be reached on (703) 308-5318. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Meless Zewdu
Examiner

23 September 2003**



WILLIAM TROST
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